

CLAIMS

1. A conjugate for transferring a nucleic acid molecule into a cell, characterized in that it comprises a nucleic acid molecule, a translocation domain and an antibody specific for a surface antigen of said cell, such that said nucleic acid molecule, said translocation domain and said antibody are conjugated by means of at least one bridging agent, and such that said conjugate is transfected effectively into said cell.
2. The conjugate as claimed in claim 1, characterized in that it also comprises a peptide which can be cleaved with at least one glycolytic and/or proteolytic enzyme, said antibody being attached to said translocation domain via said cleavable peptide.
3. The conjugate as claimed in claim 2, characterized in that said antibody and said cleavable peptide are attached covalently via a bridging agent preferably selected from the group composed of benzoquinone, EDC and APDP.
4. The conjugate as claimed in claim 2, characterized in that said antibody and said cleavable peptide are attached to a molecule of the avidin type by means of a bridging agent, which may be identical or different, and which is preferably selected from the group composed of biotin, benzoquinone, EDC and APDP.
5. The conjugate as claimed in claim 3 or 4, characterized in that said translocation domain is attached to said cleavable peptide via a covalent chemical bond.

6. The conjugate as claimed in claim 5, characterized in that said translocation domain is attached to a nucleic acid molecule by means of a bridging agent.
7. The conjugate as claimed in claim 6, characterized in that said bridging agent is APDP.
8. The conjugate as claimed in either of claims 6 and 7, characterized in that said antibody is attached to said cleavable peptide via a covalent bond by means of said bridging agent EDC, said cleavable peptide being attached to said translocation domain via a covalent bond by means of chemical attachment, said translocation domain being attached to said nucleic acid via a covalent bond by means of said bridging agent APDP.
9. The conjugate as claimed in claim 5, characterized in that the attachment between said translocation domain and said nucleic acid molecule is produced by means of a nucleic acid-binding molecule, said nucleic acid-binding molecule being attached to said translocation domain via a covalent bond by means of a bridging agent.
10. The conjugate as claimed in claim 9, characterized in that said bridging agent is APDP.
11. The conjugate as claimed in either of claims 9 and 10, characterized in that said antibody is attached to said cleavable peptide via a covalent bond by means of said bridging agent EDC, said cleavable peptide being attached to said translocation domain via a covalent bond by means of chemical attachment, said translocation domain being attached to said nucleic acid-binding molecule via a covalent bond by means of said

bridging agent APDP, said nucleic acid-binding molecule binding said nucleic acid via noncovalent attachment.

- 5 12. The conjugate as claimed in claim 1, characterized
in that it also comprises a nucleic acid-binding
molecule, such that said translocation domain,
said antibody and said nucleic acid-binding
10 molecule are attached to a molecule of the avidin
type by means of a bridging agent, which may be
identical or different, said nucleic acid-binding
molecule binding said nucleic acid molecule.
- 15 13. The conjugate as claimed in claim 1, characterized
in that it also comprises a nucleic acid-binding
molecule and a peptide which can be cleaved with
at least one glycolytic and/or proteolytic enzyme,
such that said translocation domain, said antibody
20 and said cleavable peptide are attached to a
molecule of the avidin type by means of a bridging
agent, which may be identical or different, said
nucleic acid-binding molecule being bound to said
nucleic acid molecule, said nucleic acid-binding
25 molecule being attached to said cleavable peptide
and bound to said nucleic acid molecule.
- 30 14. A conjugate for transferring a nucleic acid
molecule into a cell, characterized in that it
comprises a nucleic acid molecule, an antibody
specific for a cell surface antigen and a nucleic
acid-binding molecule, such that said conjugate is
transfected effectively into said cell.
- 35 15. The conjugate as claimed in claim 14,
characterized in that it also comprises a peptide
which can be cleaved with at least one glycolytic
and/or proteolytic enzyme, said antibody being

attached to said nucleic acid-binding molecule via said cleavable peptide.

- 5 16. The conjugate as claimed in claim 15, characterized in that said antibody and said cleavable peptide are attached covalently via a bridging agent preferably selected from the group composed of benzoquinone, EDC and APDP.
- 10 17. The conjugate as claimed in claim 15, characterized in that said antibody and said cleavable peptide are attached to a molecule of the avidin type by means of a bridging agent, which may be identical or different, preferably
15 selected from the group composed of biotin, benzoquinone, EDC and APDP.
- 20 18. The conjugate as claimed in claim 16 or 17, characterized in that said cleavable peptide is attached to said nucleic acid-binding molecule by means of a bridging agent, said nucleic acid-binding molecule binding said nucleic acid via noncovalent attachment.
- 25 19. The conjugate as claimed in claim 18, characterized in that said bridging agent is APDP.
- 30 20. A conjugate for transferring a nucleic acid molecule into a cell, characterized in that it comprises a nucleic acid molecule, an antibody specific for a cell surface antigen and a peptide which can be cleaved with at least one glycolytic and/or proteolytic enzyme, such that said
35 conjugate is transfected effectively into said cell.
21. The conjugate as claimed in claim 20, characterized in that said antibody and said

cleavable peptide are attached covalently via a bridging agent preferably selected from the group composed of benzoquinone, EDC and APDP.

- 5 22. The conjugate as claimed in claim 20,
characterized in that said antibody and said
cleavable peptide are attached to a molecule of
the avidin type by means of a bridging agent,
which may be identical or different, preferably
10 selected from the group composed of biotin,
benzoquinone, EDC and APDP.
23. The conjugate as claimed in claim 21 or 22,
characterized in that said cleavable peptide is
15 attached to said nucleic acid via a covalent bond
by means of a bridging agent.
24. The conjugate as claimed in claim 21 or 22,
characterized in that the attachment between said
20 cleavable peptide and said nucleic acid molecule
is produced by means of a nucleic acid-binding
molecule, said nucleic acid-binding molecule being
attached to said cleavable peptide via a covalent
bond by means of a bridging agent.
- 25 25. The conjugate as claimed in claims 23 and 24,
characterized in that said bridging agent is APDP.
26. The conjugate as claimed in any one of claims 20
30 to 25, characterized in that said conjugate also
comprises a translocation domain.
27. The conjugate as claimed in claim 26,
characterized in that said translocation domain is
35 attached covalently, by means of a bridging agent,
to said nucleic acid molecule and/or to said
nucleic acid-binding molecule.

28. The conjugate as claimed in any one of claims 1, 6, 8, 13, 14, 17 and 22, characterized in that said bridging agent is selected from the group composed of benzoquinone, biotin, carbodiimides and bridging agents having at least one phenylazide group which reacts to ultraviolet (UV) radiation.
29. The conjugate as claimed in claim 1, characterized in that said bridging agent is selected from the group composed of benzoquinone, biotin, EDC and APDP.
30. The conjugate as claimed in claim 12, characterized in that the bridging agent which attaches said translocation domain and said antibody to the molecule of the avidin type is biotin and the bridging agent which attaches said nucleic acid-binding molecule to the molecule of the avidin type is benzoquinone.
31. The conjugate as claimed in claim 13, characterized in that the bridging agent which attaches said translocation domain and said antibody to the molecule of the avidin type is biotin and the bridging agent which attaches said cleavable peptide to the molecule of the avidin type is benzoquinone.
32. The conjugate as claimed in claim 12, characterized in that the bridging agent which attaches said translocation domain, said antibody and said nucleic acid-binding molecule is biotin.
33. The conjugate as claimed in claim 13, characterized in that the bridging agent which attaches said translocation domain, said antibody and said cleavable peptide is biotin.

34. The conjugate as claimed in claim 17,
characterized in that the bridging agent which
attaches said antibody to the molecule of the
avidin type is biotin and the bridging agent which
attaches said nucleic acid-binding molecule to the
molecule of the avidin type is benzoquinone.
35. The conjugate as claimed in claim 17,
characterized in that said bridging agent is
biotin.
36. The conjugate as claimed in any one of claims 1 to
35, characterized in that said nucleic acid
molecule is chosen from single-stranded DNA,
double-stranded DNA, single-stranded RNA, double-
stranded RNA and an RNA/DNA hybrid.
37. The conjugate as claimed in claim 36,
characterized in that said nucleic acid molecule
is double-stranded DNA or single-stranded RNA
which encodes a protein product of interest which
is expressed effectively in said cell.
38. The conjugate as claimed in claim 35,
characterized in that said protein product of
interest is chosen from a group composed of
cytokines, lymphokines, chemokines, growth
factors, killer genes, genes which make it
possible to lift chemoresistance and restriction
enzymes.
39. The conjugate as claimed in claim 38,
characterized in that the protein product of
interest is the Bax protein.

40. The conjugate as claimed in claim 36, characterized in that said nucleic acid molecule is an antisense RNA.
- 5 41. The conjugate as claimed in any one of claims 8 to 10, 12 to 19, 24, 30, 32 and 34, characterized in that the nucleic acid binding molecule binds said nucleic acid molecule via noncovalent attachment.
- 10 42. The conjugate as claimed in any one of claims 8 to 10, 12 to 19, 24, 30, 32, 34 and 41, characterized in that the nucleic acid-binding molecule is a polycationic polymer or a nucleic acid-binding protein.
- 15 43. The conjugate as claimed in claim 42, characterized in that said polycationic polymer is chosen from poly-L-lysine, poly-D-lysine, polyethylenimine, polyanilinoamine, polyamine and
- 20 free polycations.
44. The conjugate as claimed in claim 43, characterized in that said polycationic polymer is poly-L-lysine.
- 25 45. The conjugate as claimed in claim 42, characterized in that said nucleic acid-binding protein is chosen from histones, protamine, ornithine, putrescine, spermidine, spermine,
- 30 transcription factors and homeobox proteins.
46. The conjugate as claimed in claim 45, characterized in that said nucleic acid-binding protein is selected from the group composed of
- 35 protamine and histones.
47. The conjugate as claimed in any one of claims 1 to 13, 26, 27 and 30 to 33, characterized in that

said translocation domain derives from a viral toxin, but does not contain the part of the toxin which confers on it its toxic effect.

- 5 48. The conjugate as claimed in claim 47,
characterized in that said translocation domain is
a fragment of *Haemophilus A* hemagglutinin.
- 10 49. The conjugate as claimed in any one of claims 1 to
48, characterized in that said antibody is a
monoclonal antibody or a polyclonal antibody.
- 15 50. The conjugate as claimed in claim 49,
characterized in that said antibody is specific
for a membrane-bound surface antigen.
- 20 51. The conjugate as claimed in claim 50,
characterized in that said antigen is the G250
antigen.
- 25 52. The conjugate as claimed in claim 50,
characterized in that said antibody is the 5C5
monoclonal antibody obtained with the 5C5
hybridoma deposited at the CNCM under the No.
I-2184.
- 30 53. The conjugate as claimed in any one of claims 1 to
52, as a medicinal product.
- 35 54. The conjugate as claimed in any one of claims 1 to
52, as a medicinal product for gene therapy.
55. The conjugate as claimed in claims 53 and 54, as a
medicinal product for the treatment of acquired or
constitutional genetic diseases.
56. The conjugate as claimed in claim 55, as a
medicinal product for the treatment of acquired

genetic diseases chosen from cancers and infectious diseases.

57. The conjugate as claimed in claim 56, as a medicinal product for the treatment of renal cell carcinoma (RCC).
58. The conjugate as claimed in any one of claims 1 to 52, as a medicinal product intended to transfer a nucleic acid molecule into a cell, characterized in that said cell is brought into contact with said conjugate so as to transfect said cell with said conjugate.
59. The conjugate as claimed in claim 58, characterized in that said nucleic acid molecule encodes a protein product of interest which is expressed effectively in said transfected cell.
60. The conjugate as claimed in claim 58, characterized in that said nucleic acid molecule is maintained in the form of an extrachromosomal replicon in said cell.
61. The conjugate as claimed in claim 58, characterized in that said nucleic acid molecule integrates into the genomic and/or mitochondrial DNA of said transfected cell.
62. The conjugate as claimed in claims 58 to 61, characterized in that said cell is a eukaryotic cell.
63. A pharmaceutical composition, in particular for the treatment of diseases by gene therapy, which comprises a therapeutically effective amount of a conjugate as claimed in any one of claims 1 to 52 and a pharmaceutically acceptable vehicle.

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